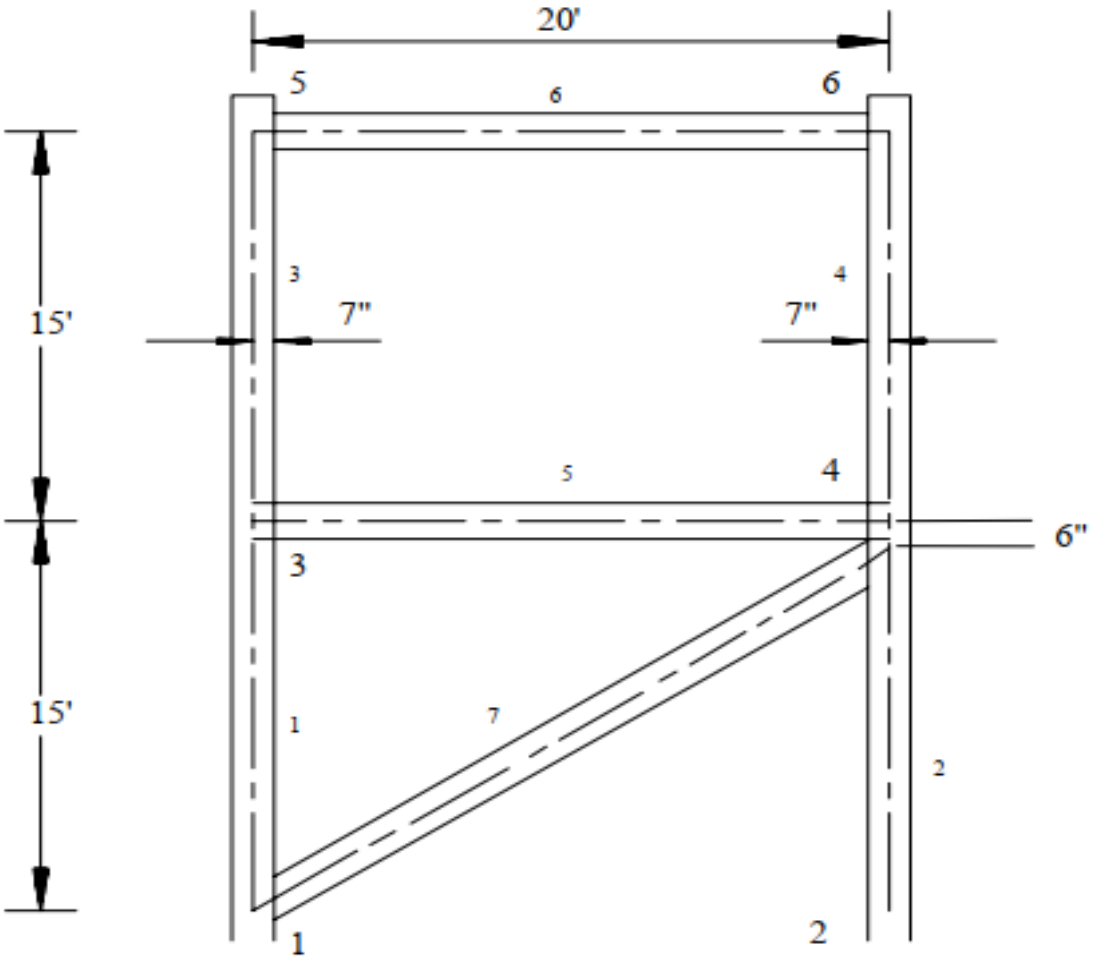
Example Problem No. 7

This example illustrates modelling of structures with OFFSET connections. OFFSET connections arise when the center lines of the connected members do not intersect at the connection point. The connection eccentricity behaves as a rigid link and is modeled through specification of MEMBER OFFSETS.



Actual input is shown in bold lettering followed by explanation.

STAAD PLANE TEST FOR MEMBER OFFSETS

Every input has to start with the word STAAD. The word PLANE signifies that the structure is a plane frame structure and the geometry is defined through X and Y axes.

UNIT FT KIP

Specifies the unit to be used for data to follow.

JOINT COORD
1 0. 0. ; 2 20. 0. ; 3 0. 15.
4 20. 15. ; 5 0. 30. ; 6 20. 30.

Joint number followed by X and Y coordinates are provided above. Since this is a plane structure, the Z coordinates need not be provided. Semicolon signs (;) are used as line separators. This allows us to provide multiple sets of data in one line.

MEMB INCI
1 1 3 2 ; 3 3 5 4
5 3 4 ; 6 5 6 ; 7 1 4

Defines the members by the joints they are connected to.

MEMB PROP AMERICAN
1 TO 4 TABLE ST W14X90
5 6 TA ST W12X26
7 TA LD L90408

Member properties are assigned from the American (AISC) steel table for all members. The word ST stands for standard single section. LD stands for long leg back-to-back double angle.

UNIT INCH
MEMB OFFSET
5 6 START 7.0 0.0 0.0
5 6 END -7.0 0.0 0.0
7 END -7.0 -6.0 0.0

The above specification states that an OFFSET is located at the START/END joint of the members. The X, Y and Z global coordinates of the offset distance from the corresponding incident joint are also provided. These attributes are applied to members 5, 6 and 7.

```
CONSTANT
E 29000. ALL
POISSON STEEL ALL
```

Material constants like E (modulus of elasticity) and Poisson's ratio are provided following the keyword CONSTANT.

```
SUPPORT
1  2  PINNED
```

Pinned supports are specified at joints 1 and 2. The word PINNED signifies that no moments will be carried by these supports.

```
LOADING 1 WIND LOAD
```

Load case 1 is initiated along with an accompanying title.

```
JOINT LOAD
3 FX 50. ; 5 FX 25.0
```

Load 1 contains joint loads at nodes 3 and 5. FX indicates that the load is a force in the global X direction.

```
PERFORM ANALYSIS
```

The above command is an instruction to perform the analysis.

```
UNIT FT
PRINT FORCES
PRINT REACTIONS
```

The above PRINT commands are self-explanatory. The preceding line causes the results to be written in the length unit of feet.